Met Office

Quantifying risk

Uncertainty is an issue in any planning for the future. Future global and local populations, economic conditions and climate all contain some uncertainty and planning needs a risk assessment of these multiple factors to come up with a coherent view of what the future may hold.

The Met Office Hadley Centre has developed new tools for quantifying the risks of climate change for particular sectors, such as food and water supply, health and flooding. This enables planners to move beyond a single best estimate of the future and, where appropriate, to include provision for less likely but more extreme changes.

Our system can be applied in any part of the world to assess the risks of dangerous climate change so that governments can understand the threat of climate change to their national and economic security, and to inform decisions about emissions reductions.

In order to generate the range of possible futures, scientists generate model projections that take account of uncertainties in the following:

- Emissions – which themselves depend on factors such as economic growth and actions to reduce greenhouse gases.
- Natural variations – where gradual change is overlaid with variations that occur naturally and make up the day-to-day weather and variations from one year to the next, for example El Niño. Other variations arise through changes in natural factors such as variations in the heating from the sun and the impact of particles (aerosols) produced by volcanic eruptions.
- Science – which depends on our ability to understand and model the important processes that affect climate. In particular, there are still uncertainties in the strength of feedbacks in clouds and the carbon cycle (how plants and the biosphere react to carbon dioxide).

Until recently the uncertainty in the science was not quantified in a systematic way. New techniques developed in 2004, using multiple computer models developed at the Met Office Hadley Centre, allowed scientists to quantify uncertainty and to provide a more systematic risk assessment of climate change on the global scale.

This multiple model technique has been improved and extended over the last few years to provide information that can be used in risk assessment regionally at a resolution of 25 km.

"We have used a set of Met Office Hadley Centre projections of future climate over the UK to assess uncertainties in floods in the future in the Upper Severn catchment. The climate data feeds into a modelling system that produces flood inundation maps. Eventually this will help the local Environment Agency to make decisions on action to prevent possible damage caused by floods in the future."

Fredrik Wetterhall
Hydrology researcher,
Kings College London

CHANGES IN EUROPEAN SUMMER RAINFALL

Early results for northern Europe based on an ensemble of Met Office Hadley Centre simulations show that average summer rainfall for 2070–2100 is likely to decrease by between 5 and 20% (the dark blue shaded area in the figure below).

Average winter rainfall (not shown), on the other hand, is very likely to increase. This will inform planning decisions on how to store and distribute water and how to respond to floods.

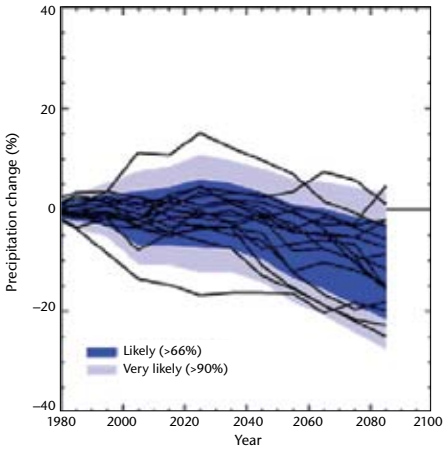

Figure: Projected change in northern European summer precipitation using the A1B emissions scenario, based on a 17-member ensemble.

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